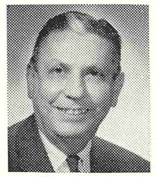
OHIO BRASS MANAGEMENT REPORT

He came to buy but stayed to invent an insulator

BY ROGER A. BLACK
PRESIDENT, OHIO BRASS COMPANY

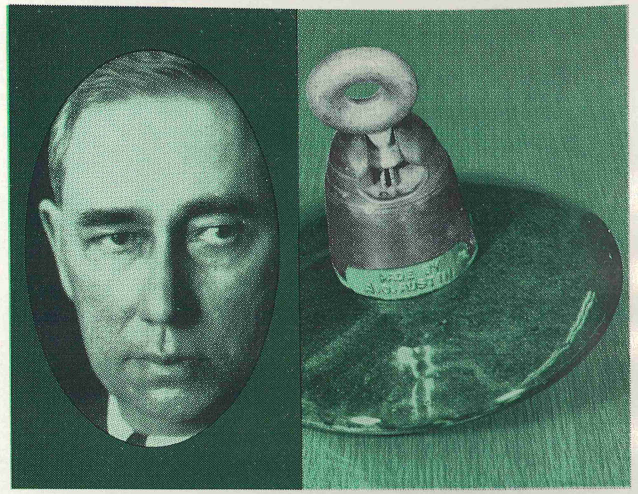


He came East from a California utility—a young engineer with a mission. He had been sent by his company to find a reliable source of high voltage insulators. The year: 1905. His name: A. (Arthur) O. Austin. It would make good sales ammunition to report that after exhaustive research he recommended Ohio Brass as the sole supplier. But we must stick to the facts. Besides, O-B was only part way into the insulator business at that time.

OUR YOUNG MAN FOUND that insulator manufacture was in the hands of pottery and dishware people. Understandably, they didn't know how to apply the principles of physics to combine two vastly different materials—metal and porcelain—into an insulator with the needed mechanical and electrical properties.

AUSTIN FIRST SET UP his own insulator factory but it burned before production started. He then came to Barberton, Ohio, as a consultant for the Akron High Potential Insulator Company—O-B's porcelain supplier and soon to be wholly owned by Ohio Brass.

HE PUT HIS IDEAS TO WORK. Rather than try to get strength by merely making suspension insulators bigger, he worked with thin sections. He did away with the serrated insulator head which allowed for only a straight mechanical attachment to the cap. He substituted the sanded surface to achieve positive gripping even when porcelain and metal expanded and contracted according to their vastly different temperature coefficients. He also developed the ball-and-socket joint to gain easy coupling of insulators and save space.



SATISFIED THAT he had an efficient suspension insulator design, "A. O." turned to high voltage research. You have probably seen pictures of the industry's first high voltage laboratory which he set up on his farm near the center of Barberton. Much of the technological background for modern EHV transmission evolved here as utilities brought their ideas for checking.

WE RECENTLY DISCOVERED the original cap-and-pin suspension insulator bearing the tag "Made by A. O. Austin." It evoked a flood of memories, including those you have just read, plus acknowledgement of the considerable debt our industry owes this man who died in 1964.

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OHIO BRASS

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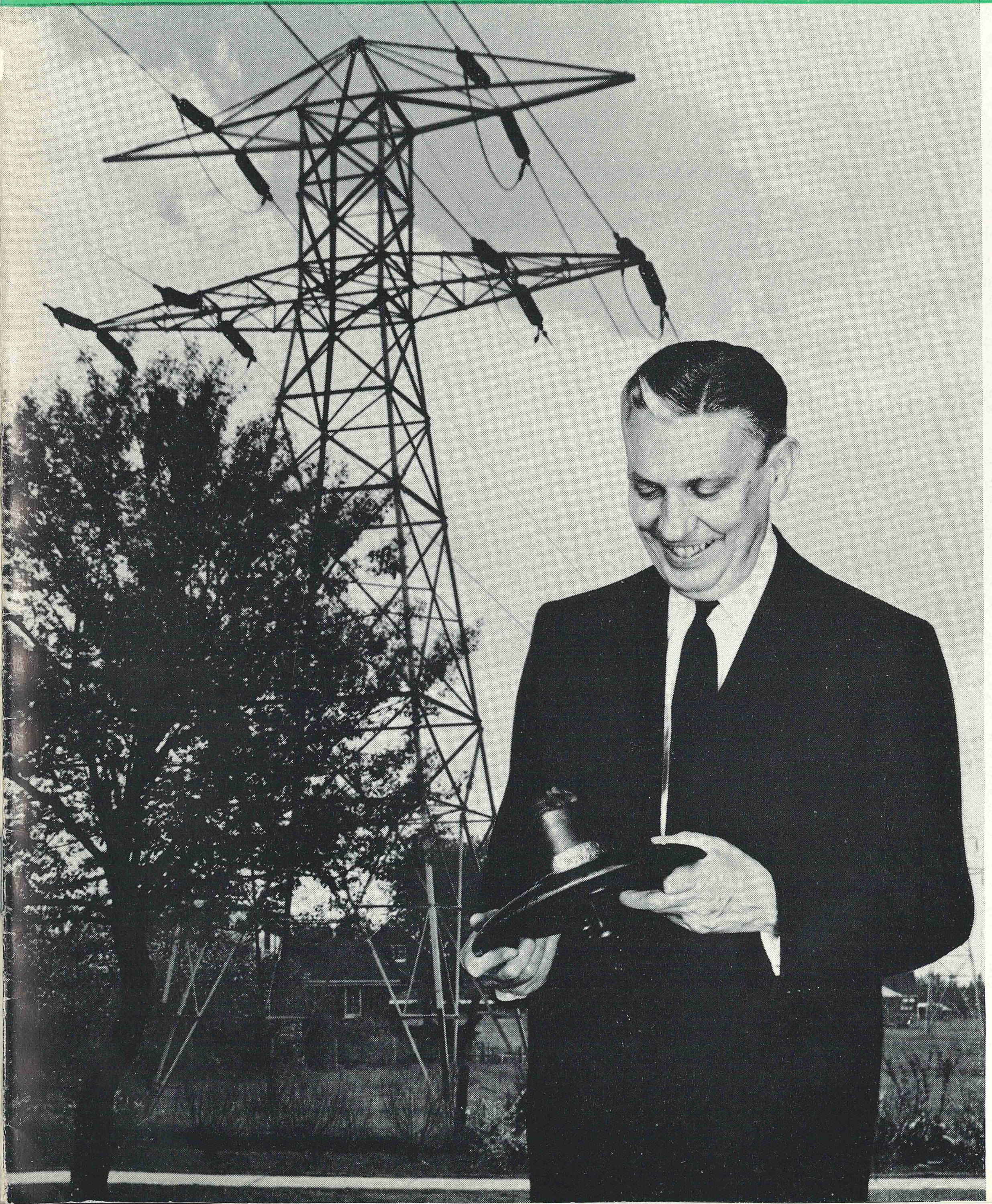


Roger A. Black, President of O-B, looks at insulator "Number One" . . . See page three.

Horizontal posts put "on the rack"

Special machine tests cantilever strength of O-B porcelain, malleable parts, and how they're put together

Just prior to final inspection and crating for shipment, Ohio Brass horizontal line posts are subjected to a test which checks the cantilever strength of each unit.

The test machine looks like an instrument from a medieval torture chamber. But it's a cantilever test device -- as up to date as the O-B horizontal line post it tests.

Even so, we might say torture *is* its business. All Ohio Brass horizontals are "put on the rack" of this machine and tested to 70 per cent of their rated cantilever strength. The machine is simply constructed and is easy to use. A post can be fully tested in less than a minute.

The line post base fits into a jig which is dogged down to grip the unit firmly. This acts the same as a fixed mounting on a pole. A metal collar fits over the clamptop cap. The collar is attached to two, air-operated arms. Each is positioned to apply push or pull forces to the top of the post. The two arms are at right angles to each other. Thus, the test machine applies cantilever proof load at the quarter points around the circumference. Each force is 2000 pounds, about 70 per cent of cantilever rating.

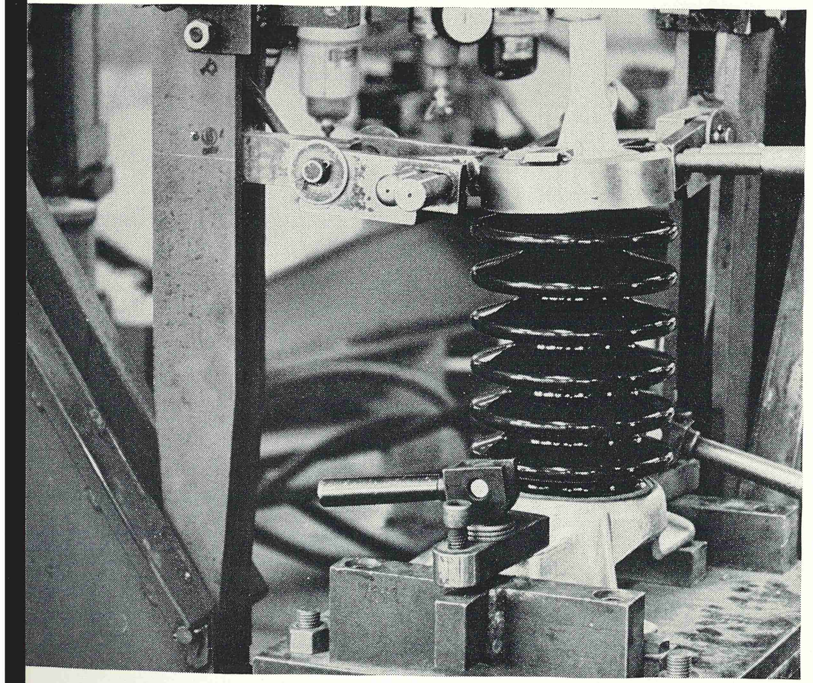
O-B horizontals take this proof test in stride just as they do in service. Their "secrets" to success are at least three in number:

1. O-B porcelain is strong. It begins with the finest clays and the many steps of manufacturing are closely controlled to stand the rigors of service.

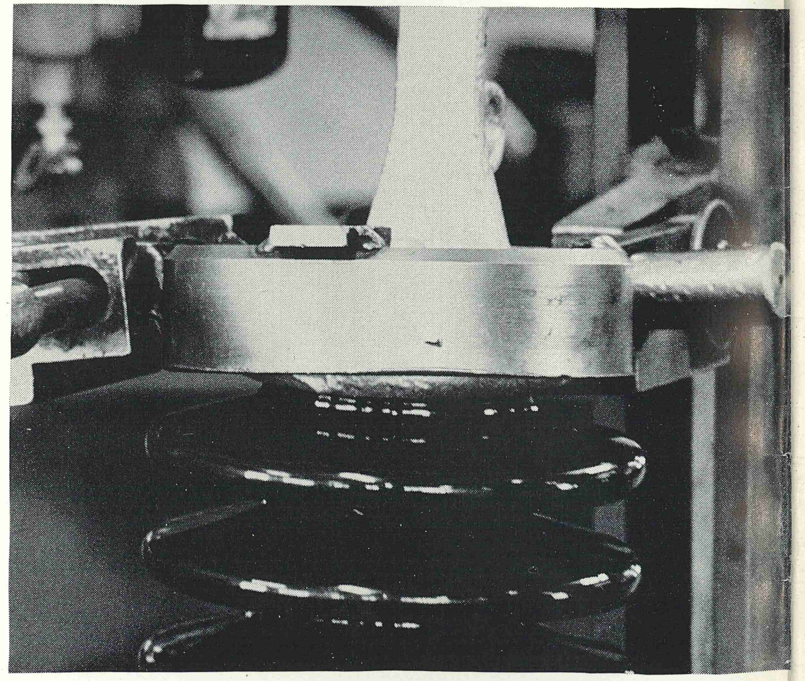
2. O-B malleable-iron base and top casting parts are equally rugged. Ohio Brass is the only major supplier who makes both the porcelain and the matching malleable parts; they're made to work together.

3. O-B makes allowances for dimensional variations between the malleable iron and the porcelain which result from temperature changes. The inside of the cap is coated with a soft asphalt compound which has an expansion rate 150 times greater than porcelain. The asphalt provides relief -- the extra micro-inches of space needed to relieve low-temperature mechanical stress.

In summary, O-B's cantilever test for horizontal line posts proves the value of combining excellent raw materials, good production methods, and a fine idea.



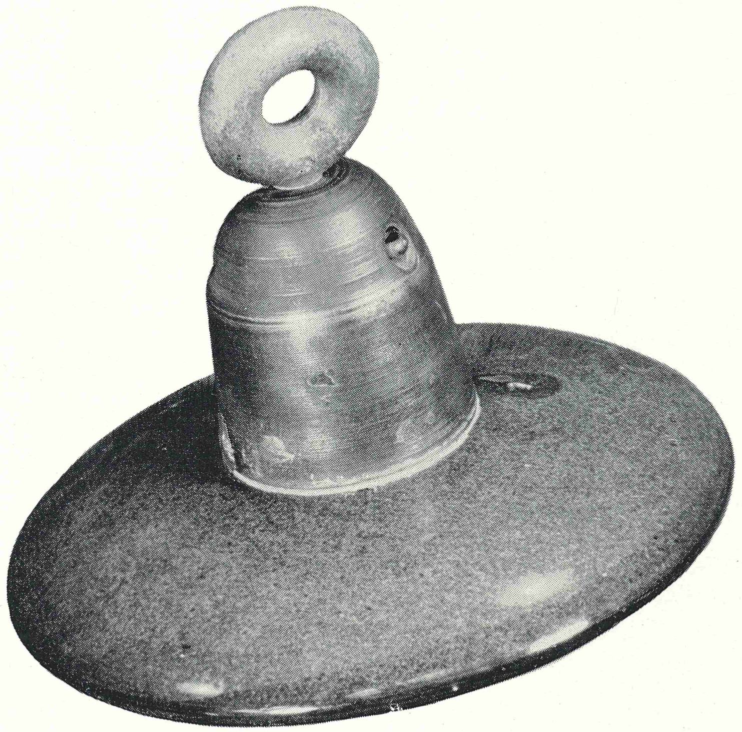
All Ohio Brass horizontal line posts are "put on the rack" of this machine and tested to levels in excess of the recommended service load.



A husky, metal collar fits over the clamptop cap; two power, air-operated arms exert push or pull cantilever forces on the horizontal line post.

Suspension Insulator "Number One" comes to light

It was like unearthing a time capsule!

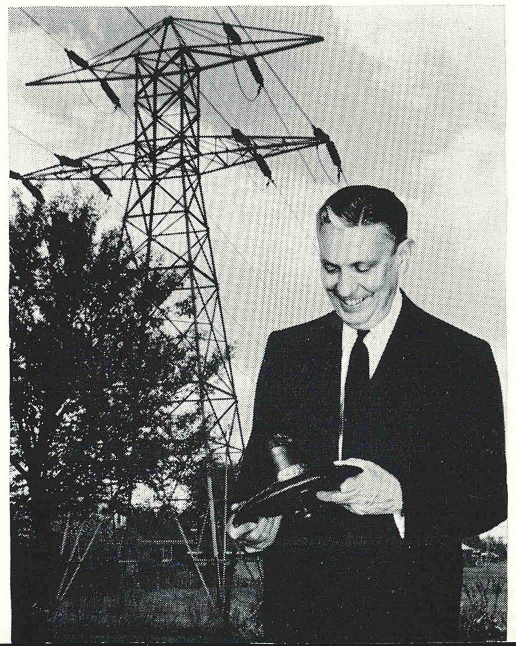


In going through some long-forgotten records and other items that precede the memory of anyone now working for Ohio Brass, we came across this sample of a suspension insulator. By great good fortune a little metal nameplate that fixed it in history had been soldered to the cap. But this was hardly necessary. The cap and pin both show machine marks and the traces of hand tools. There was only one hand-made suspension insulator, and that obviously was the first one.

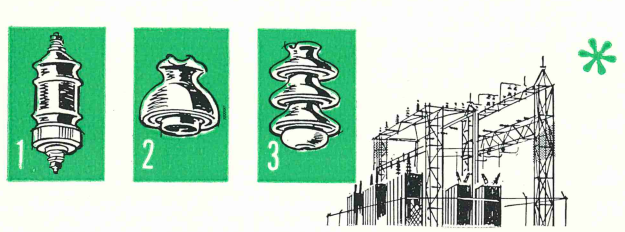
This is the insulator that was literally "whittled out" to submit as a sample with our proposal to equip the pioneer 115-kv line built from Niagara Falls to Toronto in 1909. The long negotiations preceding construction of this line would date the sample about 1906. Here is the industry's first cap-and-pin suspension insulator. It would be impossible to estimate the millions of descendants it has spawned. Even with an effort at modesty, we feel it an historic piece.

While this insulator has come to light only in the last few weeks, several visitors at our plant have already examined it somewhat reverently. Their comments are surprisingly similar. "It must have been a stroke of genius to design a product that has required no basic change in 60 years of world-wide manufacture and application."

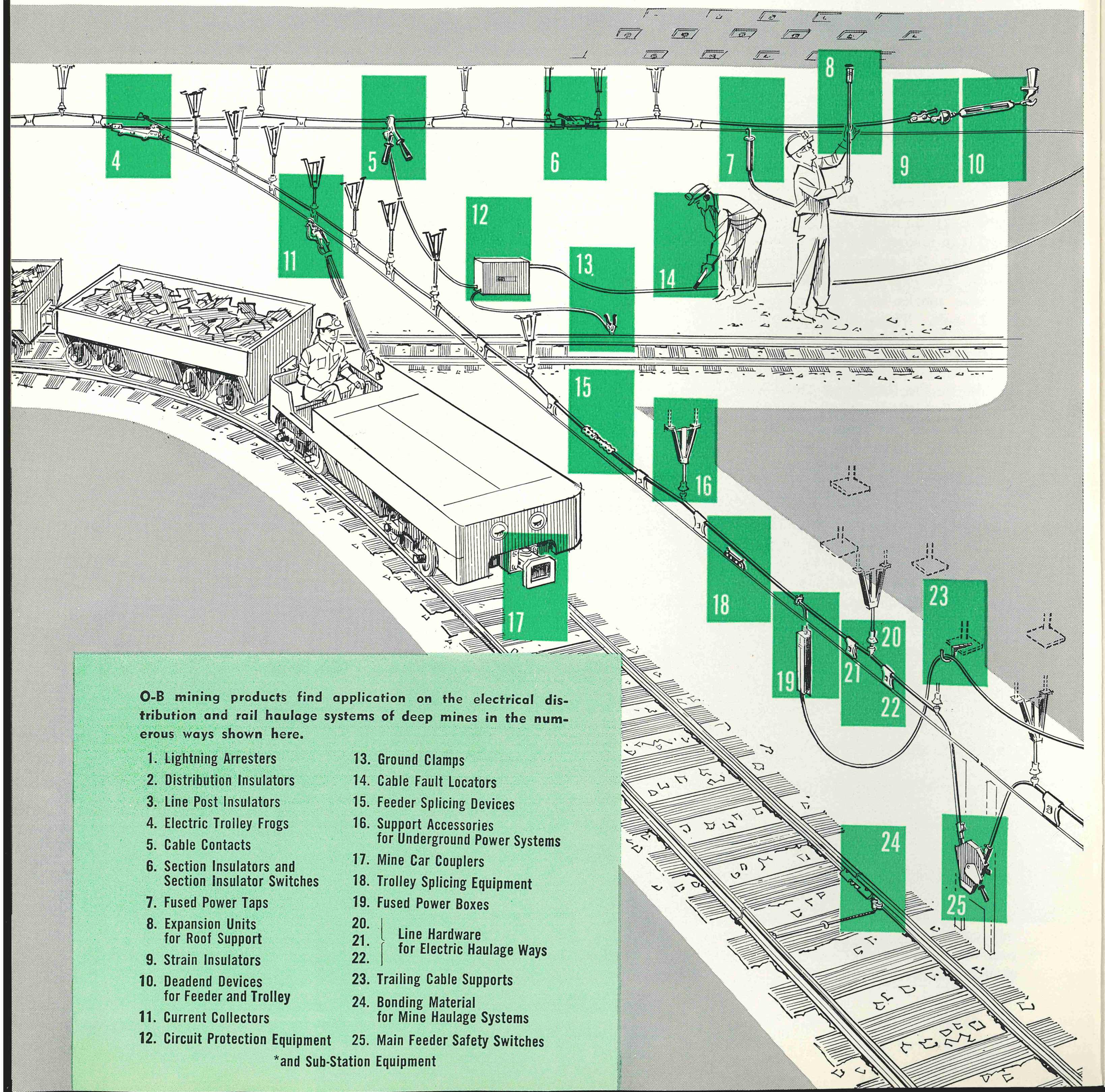
This model has been improved in countless ways during those 60 years, as we all know, but the original concept of a cap-and-pin suspension insulator certainly demonstrates remarkable foresight.



Roger A. Black, O-B president, examines "insulator Number One" in an appropriate setting—beneath the line in Niagara Falls where the first cap-and-pin suspension insulators were installed in 1909.



O-B products serve mine-owning utilities



O-B mining products find application on the electrical distribution and rail haulage systems of deep mines in the numerous ways shown here.

1. Lightning Arresters
2. Distribution Insulators
3. Line Post Insulators
4. Electric Trolley Frogs
5. Cable Contacts
6. Section Insulators and Section Insulator Switches
7. Fused Power Taps
8. Expansion Units for Roof Support
9. Strain Insulators
10. Deadend Devices for Feeder and Trolley
11. Current Collectors
12. Circuit Protection Equipment
13. Ground Clamps
14. Cable Fault Locators
15. Feeder Splicing Devices
16. Support Accessories for Underground Power Systems
17. Mine Car Couplers
18. Trolley Splicing Equipment
19. Fused Power Boxes
20. Line Hardware for Electric Haulage Ways
21. Line Hardware for Electric Haulage Ways
22. Line Hardware for Electric Haulage Ways
23. Trailing Cable Supports
24. Bonding Material for Mine Haulage Systems
25. Main Feeder Safety Switches

*and Sub-Station Equipment

Here's an introduction to O-B mining products for utilities developing a new mine or mine-mouth generation plant

Increasing development of mine-mouth generation puts more power companies in the new position of owning and operating coal mines. If you're one of the new mine owners, Ohio Brass wants to introduce you to another established O-B product group -- mining materials. O-B offers you a diverse line of products for use on deep-mine electrical distribution and rail haulage systems, plus products to support your mine roof.

Specifically, O-B manufactures five classes of material for your coal mine as listed in O-B Mining Catalog 70:

Line Materials
Track Materials
Locomotive and Coupler Equipment
Control Equipment for Electric Circuits
Roof Bolting Materials

Each product group is backed by more than 60 years' engineering and manufacturing experience for the mining industry.

For your overhead feeder circuit and trolley wire network, O-B supplies insulated supports, suspension-type clamps, and adapters. O-B trolley-wire splicers, trolley frogs, crossovers, and feeder combinations put power to work on the mine haulage system, while switches rated to 3000 amperes control power flow to various mine circuits. Numerous clamps, fittings, and other hardware items in the line materials group adapt to almost any electric haulage system.

Track materials from Ohio Brass consist of rail bonds -- mechanically applied or welded -- welding equipment, and third rail insulators. O-B rail bonds form a positive connection between consecutive rails to establish a return path for the overhead d-c trolley circuit on mine haulage systems. For mines using a third rail system, O-B offers a complete line of third rail insulators to support and insulate the heavy contact rail.

Sliding current collectors, collector wheels, and mine locomotive and car couplers from Ohio Brass serve your haulage equipment needs. O-B's newest coupler development is the automatic Zip-Trip coupler. One man pre-sets the new Zip-Trip for uncoupling by lifting a lever on the mine car. He then pulls the locomotive forward to disengage. As the locomotive pulls away, the coupler releases, then resets to engage on contact. One man performs the complete operation, and no personnel are in the critical coupler area during uncoupling. Like all O-B couplers, the new Zip-Trip is specially designed to avoid accidental release of a coupler on irregular mine haulage ways.

O-B's control equipment for electric circuits protects mine machinery and distribution feeder circuits. Fused taps connect trailing cables to power sources and protect both cables and equipment against damaging short circuits. O-B's Magna-Trip^{R} circuit interrupter monitors

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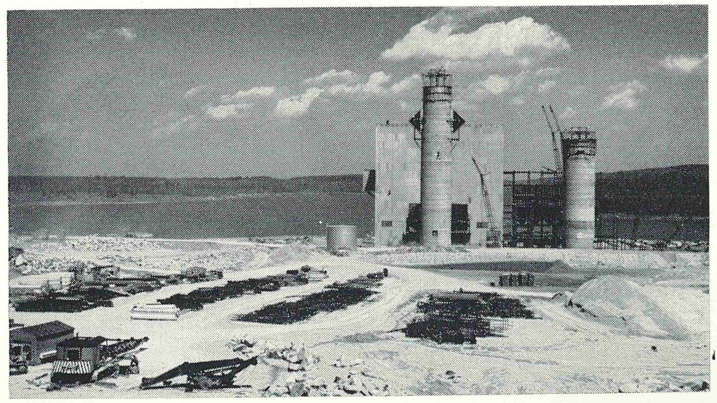
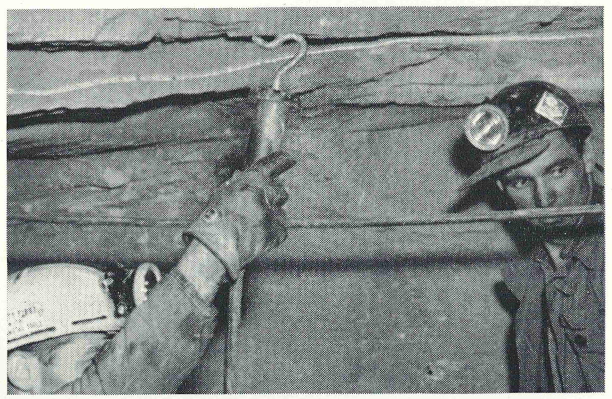


Increasing construction of mine-mouth generation facilities puts more utilities in the new position of owning and operating a coal mine. Here a new mine-mouth plant is under construction in West Virginia.



Fused taps from Ohio Brass connect trailing cables to power sources and protect cables and mining equipment from short-circuit damage.

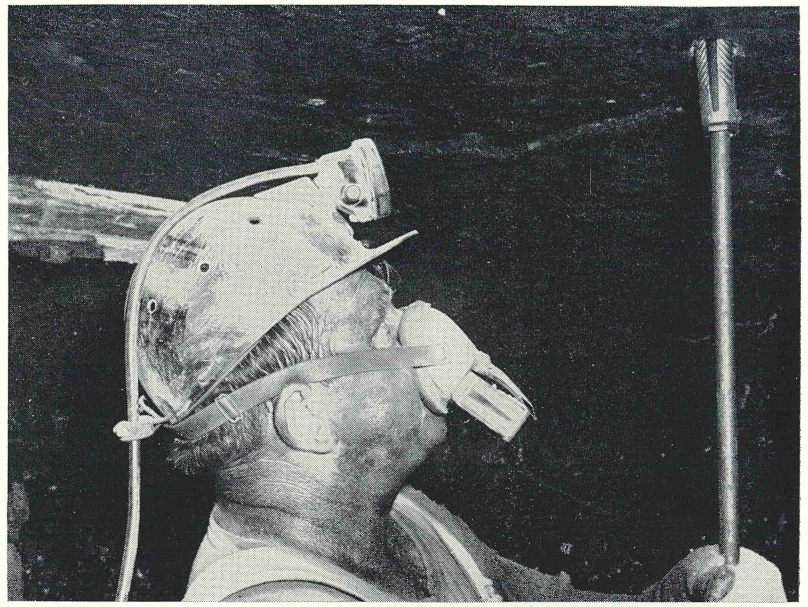
(Continued from previous page)

power flow to mining machinery and adapts to increasing circuit loads. However, the moment a short circuit appears, O-B's Magna-Trip R interrupts to prevent damage to the feeder system and electrical equipment. Fused power boxes, cable fault locators, lightning arresters, and assorted ground clamps are also available in the control equipment group.

Throughout the mining industry, O-B expansion units support more mine roofs than does any other brand of support -- valid proof of their reliability and acceptance. Two specific types of expansion units are offered by Ohio Brass. Both the Standard and Bail types incorporate the time-proved four-way expansion principle introduced by O-B. In the roof-bolting materials class, O-B also supplies hole gauges to assure proper drilling of roof bolt access holes.

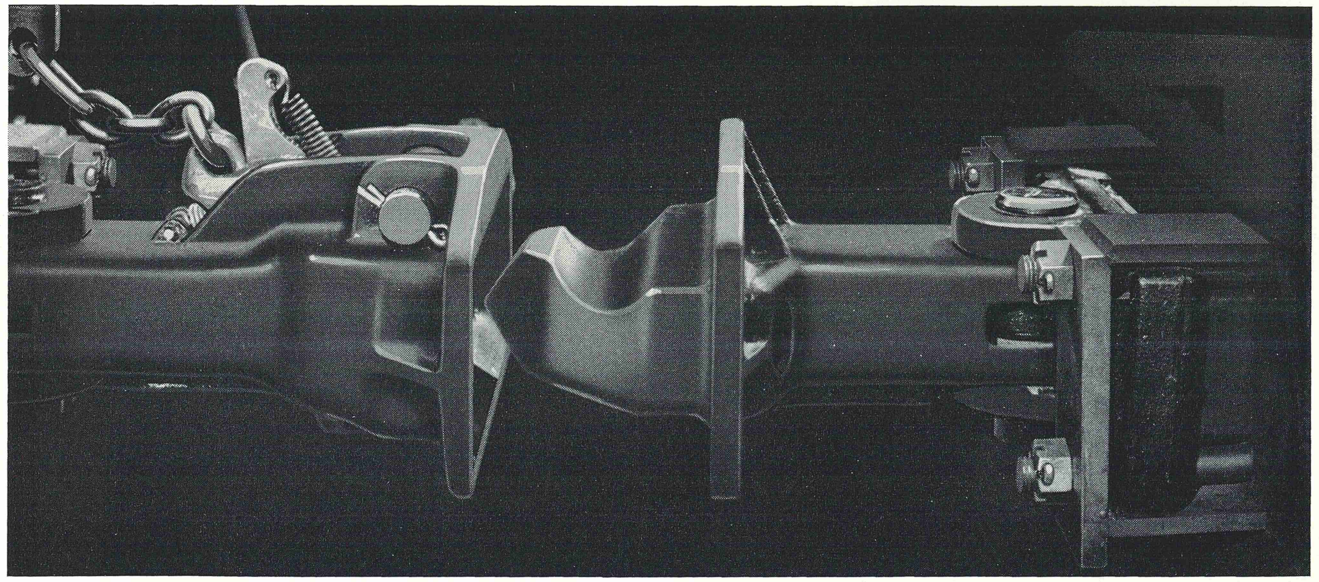
We've briefly described O-B's mining products. If you're planning construction of a mine-mouth facility or ownership of mines, check these descriptions again. Make a note of the areas which interest you, and contact your local O-B district manager. He'll be glad to help with your mining needs and explain other ways O-B serves the mining and power industries.

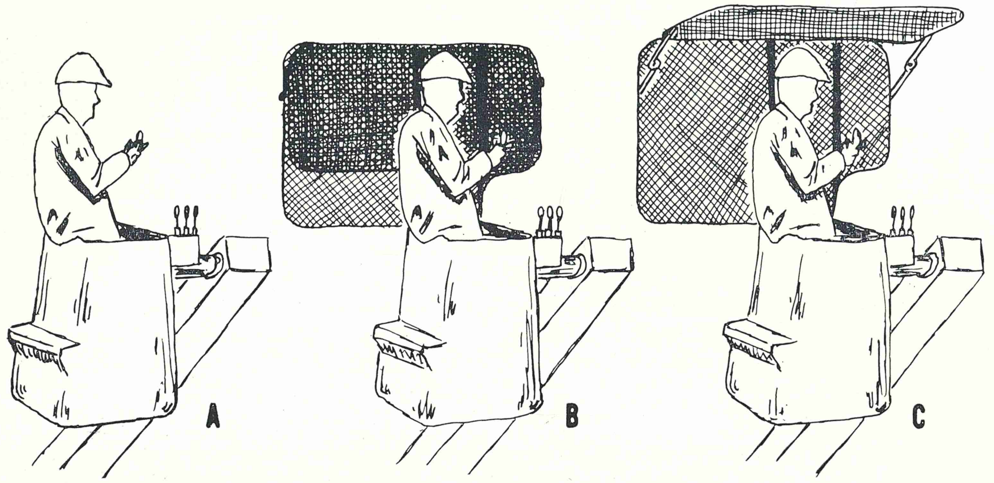
Both Standard - (left) and Bail-type (right) expansion units employ the time-proved, four-way expansion principle introduced by Ohio Brass for secure roof support.



O-B expansion units support more mine roofs than any other brand support -- valid proof of their industry-wide acceptance.

O-B's latest development in the locomotive and coupler equipment group is the automatic Zip-Trip coupler which may be operated by one man.





Several different shielding arrangements were tested on the Holan EHV-57 elbow; A. Normal bucket shielding for 138-kv use; B. Rear wall; C. Combination rear wall and overhead horizontal canopy. Each addition of shielding reduced body current substantially.

Induced body currents on live line personnel subject of IEEE discussion

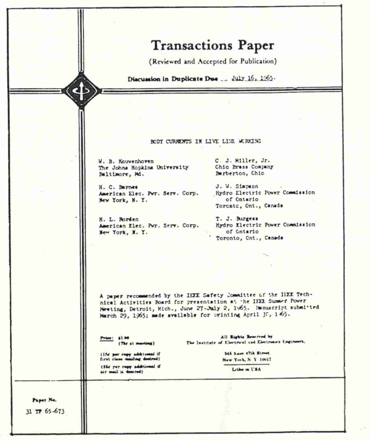
O-B Engineer co-authors paper comparing current levels during maintenance of 138- and 345-kv systems

In the area of an a-c power line, a 60-cycle electric field exists between the energized conductors and ground. Men working within this field receive induced body currents. Determination of the actual levels of these body currents served as the basis for a study conducted by six enigneers, and resulted in presentation of Transaction Paper 31 TP 65-673, *BODY CURRENTS IN LIVE LINE WORKING,* at the IEEE Summer Power Meeting in Detroit, Michigan.

Dr. Charles J. Miller, Jr., of Ohio Brass Company, participated in the research, and preparation of the resulting paper. Tests conducted on 138- and 345-kv transmission lines measured body currents of linemen using established "hot-stick" and Live Line Barehand Method maintenance techniques. Measurements were recorded with a specially designed field-intensity meter. For the Live Line Barehand Method, readings were made with several different shielding combinations on the Holan EHV-57 elbow. Normal bucket shielding, a vertical cage, and a combination vertical and overhead horizontal cage were the three configurations tested. Data were also recorded with linemen wearing a special conductive suit as an alternate method of protection from the electric field.

Throughout the series of tests, no linemen working the Live Line Barehand Method received a greater level of body current than 375 microamperes. Addition of shielding to the live line buckets reduced the recorded current flow substantially, even below the levels for linemen working from the tower structure more than 12 feet from the energized conductors.

For copies of the new IEEE Transaction Paper 31 TP 65-673, *BODY CURRENTS IN LIVE LINE WORKING,* ask your O-B district manager, or write: Ohio Brass Company, 380 North Main Street, Mansfield, Ohio 44902.



Transactions Paper
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Discussion in Duplicate Due ... July 16, 1965.

BODY CURRENTS IN LIVE LINE WORKING

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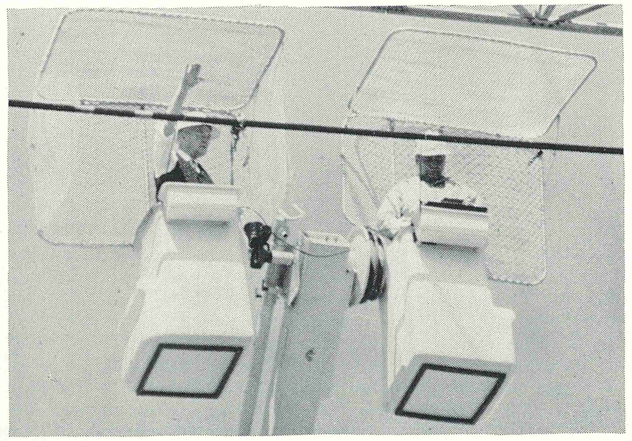
Paper No.
31 TP 65-673

IEEE Transacton Paper 31 TP 65-673 examines the values of induced body currents on personnel working energized power lines. Copies are available from your O-B district manager or direct from Ohio Brass.

During the complete series of tests preceding the IEEE Transaction Paper, **Body Currents In Live Line Working,** measured body current levels of personnel working the Live Line Barehand Method remained below 374 microamperes -- even at 345 kv.



Switching surge protection begins at the switch

Dual installation of Thorex Dynagap Arresters prevents surge propagation on PASNY 345-kv circuits

Functional location of additional O-B Dynagap 264-kv arresters at the Niagara Switchyard of Power Authority of the State of New York (PASNY) provides increased protection against the possibility of crippling switching surge damage on each of the station's two outgoing 345-kv circuits. Identical in every respect to the Dynagap lightning arresters mounted in the customary positions adjacent to the bushings of the 240/360-kv autotransformers, the switching surge arresters are installed on steel platforms at the station entrance. Arrester connections are made on the line side of the air-break switches at the very point the 345-kv lines start across the countryside.

From the Niagara Switchyard the twin PASNY 345-kv circuits extend eastward 70 miles to Station 80 at Rochester, then continue another 80 miles to Clay Station near Syracuse, and finally terminate about 50 miles farther east at an interconnection made at Edic Station north of Utica.

Engineering studies of the PASNY system coordinates made prior to line and station construction indicated the probability of severe switching surges. Consideration of these possibilities was the prime factor for the incorporation of overvoltage surge protective measures, which included installation of station entrance arresters, specifically located to be connected on the line side of the disconnect switches.

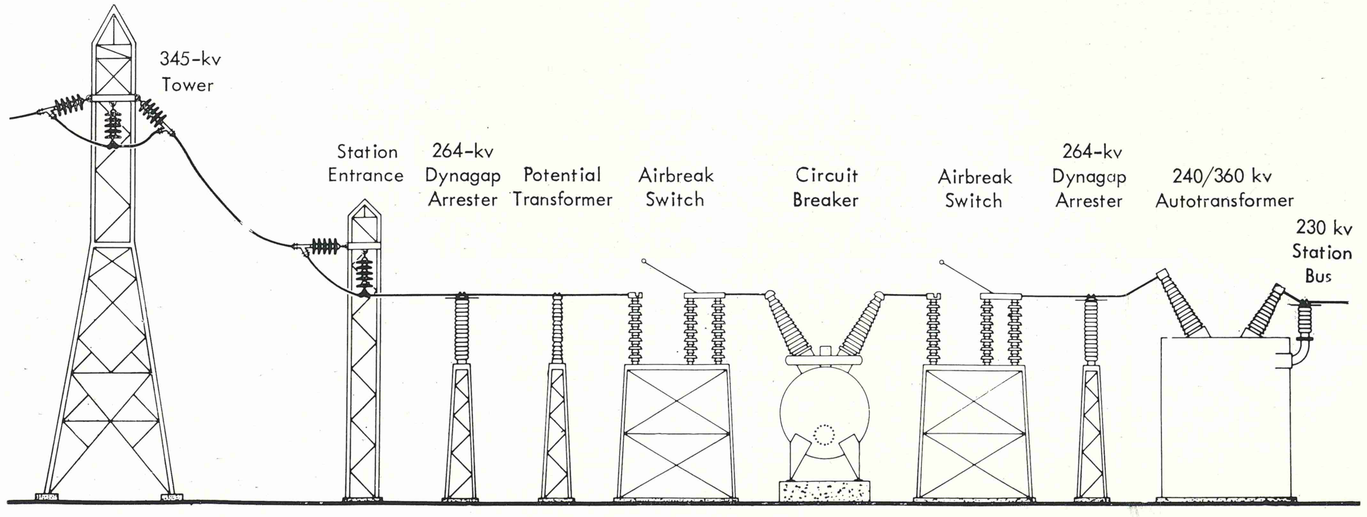
PASNY's application of Thorex Dynagap arresters to provide switching-surge protection was one of the first to utilize the expanded function of advanced-design EHV arresters now available. In contrast to conventional installations where the arrester serves as a single-purpose protective device to divert steep-front lightning waves, modern system planning now assigns the arrester the responsibility for sensing and intercepting all potentially dangerous overvoltage surges, regardless of their wave fronts, shapes, or durations.

Technical aspects of PASNY's decision to locate complementary switching surge arresters on the line side of the disconnect switches involve consideration of the origin and characteristics of EHV switching surges. This type of transient occurs under a variety of system conditions, but analyzer studies indicate that the most severe switching surges result from the energization of a transformer-terminated line or through high speed reclosing of a line which still holds a trapped charge. The switching surge appears on the transmission line as a traveling wave with the inherent ability to increase the voltage as influenced by system coordinates. Locating arresters on the line side of disconnect switches suppresses traveling-wave reflections and prevents their propagation back on the transmission lines.

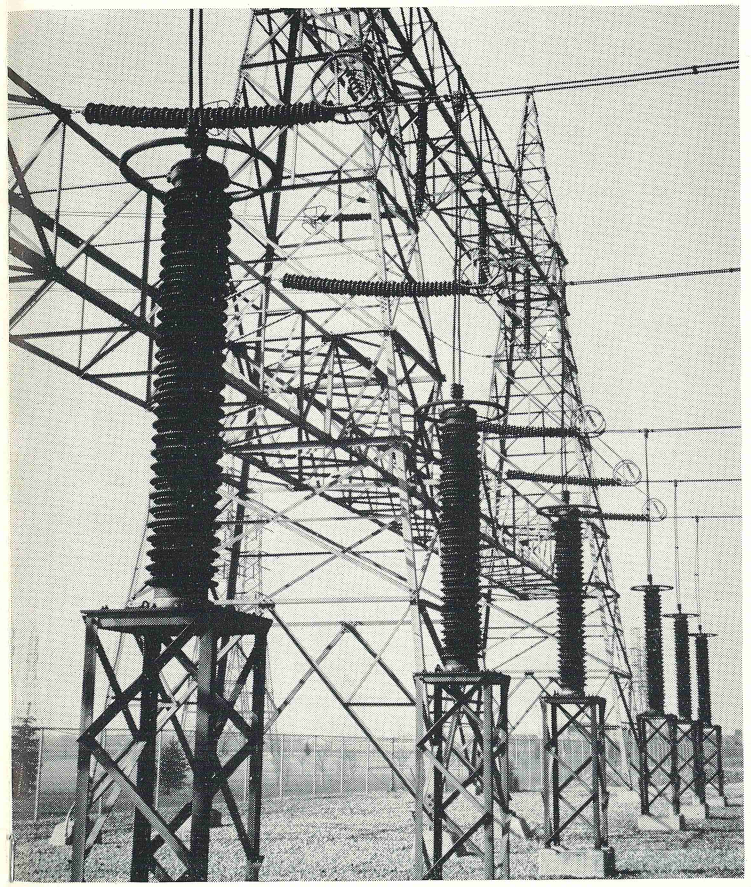
It is essential in this type of application that the arresters used to intercept switching surges have a uniform, predictable response characteristic. The straightline sparkover level provided by the O-B Dynagap enables it to sense all forms of overvoltage surges and to respond in accordance with precisely pre-determined limits.

It is even more important that lightning arresters installed for switching surge protection have the thermal capacity to discharge the electrical energy associated with severe switching surges. Two factors accentuate this operating qualification: (1) Switching-surge arresters are basically intended to operate more frequently and at more closely spaced intervals than arresters installed primarily for lightning protection and (2) the significantly longer duration of the switching surge overvoltage wave as interrelated to other system coordinates produces an energy discharge cycle far greater than that formerly associated with lightning strokes.

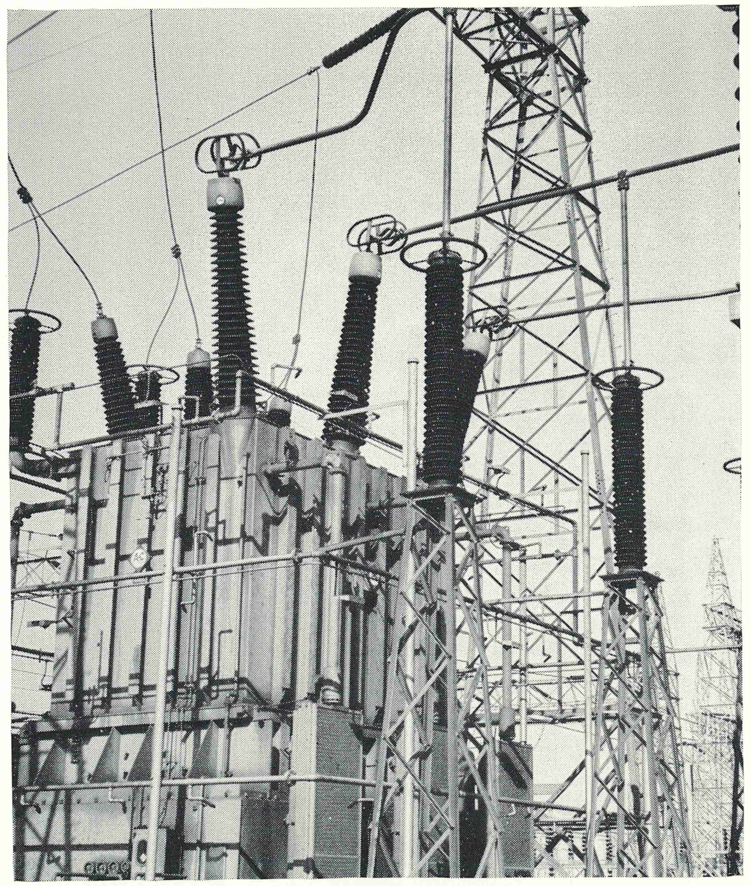
Thorex Dynagap arresters have proved their ability to provide completely satisfactory switching-surge protection on the PASNY 345-kv system. Major portion of this system has now been in operation for more than four years, making it the pioneer EHV project in New York state. Its achievement in system reliability emphasizes the importance of integrating the functional improvements in the operation of available modern equipment, such as lightning arresters, into a comprehensive plan for a high performance system.



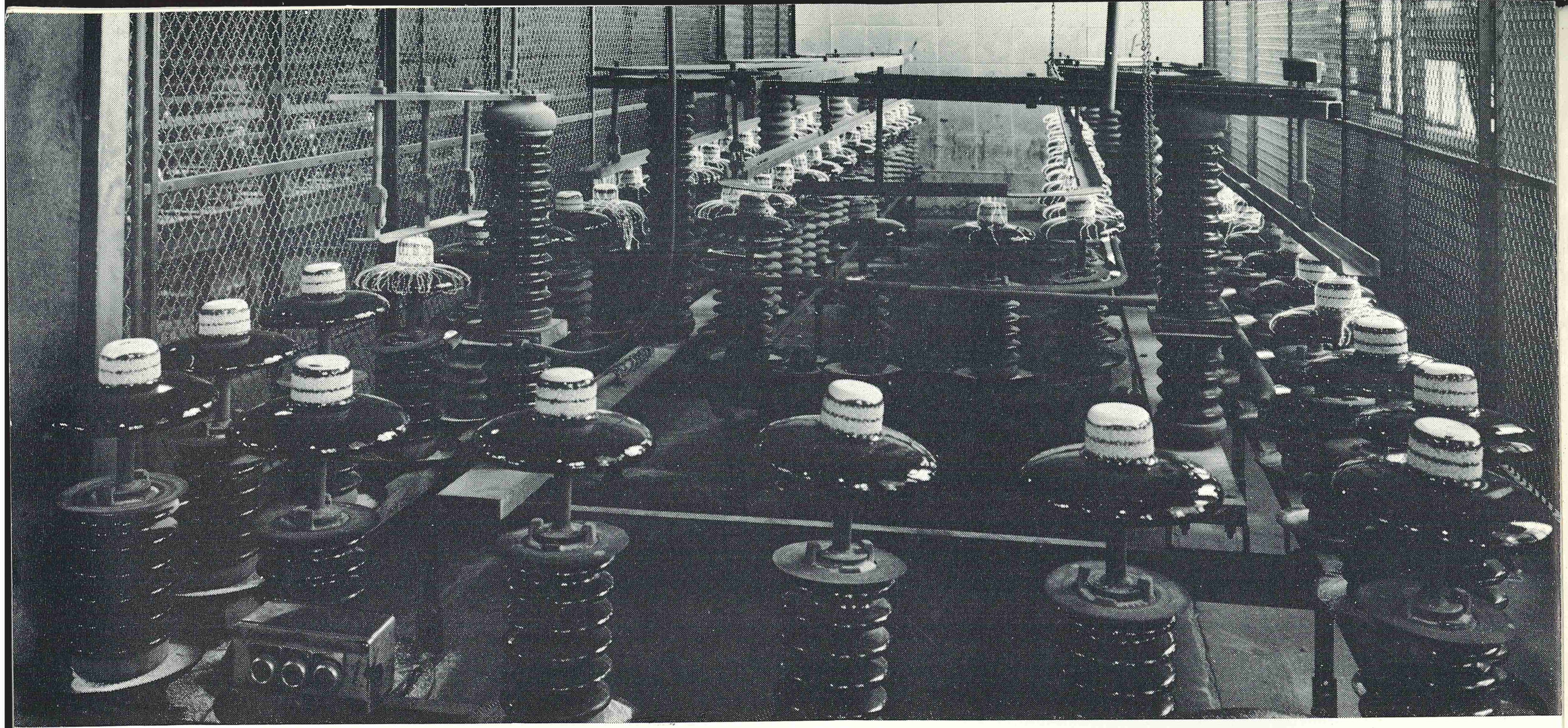
SIMPLIFIED SCHEMATIC ARRANGEMENT



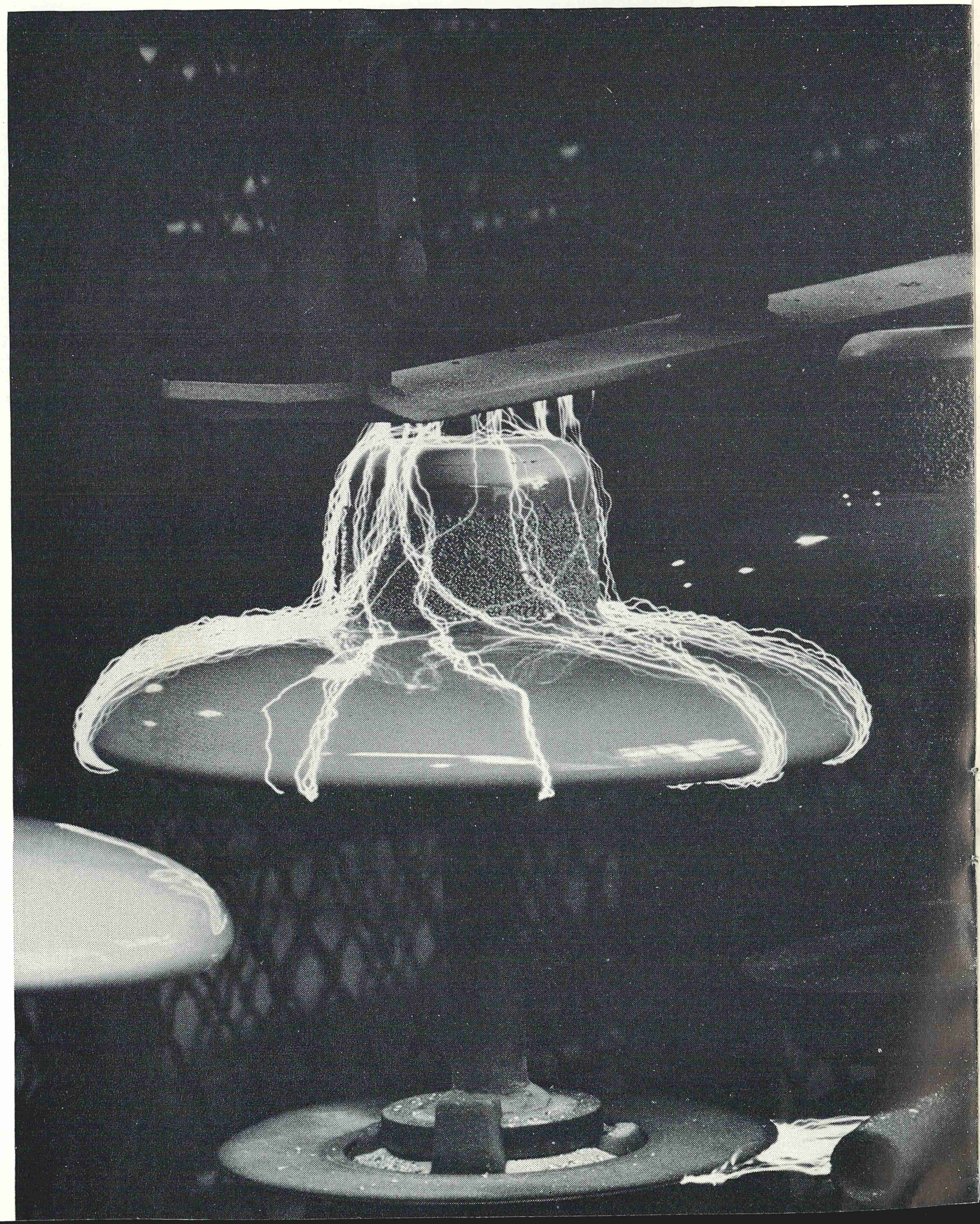
Last piece of equipment connected to each of the 345-kv transmission lines as it leaves PASNY's Niagara Switchyard is the Thorex Dynagap arrester. Lined up in a row across the station entrance these arresters function to attenuate the reflection of traveling waves caused by switching surges and thereby keep dangerous overvoltages from propagating on the long circuits. Dynagap arresters have the capacity to discharge the energy associated with the switching surges on the longest and highest voltage transmission lines.



Huge 400-mva autotransformers in PASNY Niagara Switchyard raise 230 kv from station bus to 345 kv for transmission to Rochester and points east. O-B Thorex Dynagap arresters installed adjacent to the O-B transformer bushings protect both high and low side insulation. Current-limiting Dynagaps have high degree of protective competency in handling short duration, high-current discharges characteristic of lightning strokes and only an insignificant portion of steep front surges appears in form of IR discharge voltages across the insulation of the protected equipment.



During the trip around this continuous conveyor, every porcelain disc is subjected to extended exposure to high frequency and 60-cycle current at air-flashover level. These two greatly dissimilar types of discharges have specialized abilities to reveal any dielectric weakness in the porcelain body.



Every porcelain disc for O-B suspension insulators undergoes over five minutes of this severe test above flashover voltage . . . the maximum stress that can be imposed on the dielectric in air. Note that absence of a metal cap results in at least two inches more porcelain added to arc length. This raises the test flashover several thousand volts above the limit that could be imposed on a fully assembled unit.

Painstaking electrical tests account for remarkable service record of O-B suspension insulators

A few months ago we published a short article to the effect that, " . . . we've tried 2,036,000 times to ruin every O-B suspension insulator." Some buyers have asked us to elaborate on this, since it involves the somewhat controversial topic of manufacturing inspection.

As a final step in production of an O-B porcelain suspension insulator disc, prior to being released for assembly with metal parts, it is given an elaborate electrical checkout. The purpose is twofold. It reduces manufacturing waste by sending only sound parts to assembly. Far more important, it exploits the moment of an insulator's life when a thorough electrical test can be most revealing.

Immediately out of the firing kilns, the discs take a trip of over five minutes on a circulating conveyor. Each disc perches on a metal support that is in solid contact with the inside top surface of the head section. This metal support is grounded. As the conveyor moves, the discs travel under an electrode that applies flashover voltage throughout the entire five-minute period. Since this voltage exceed the breakdown strength of the surrounding air, it represents the maximum that can be impressed on the piece in air.

As the disc goes through the conveyor it first receives five seconds of 200,000-cycle high frequency . . . it is given its first two million chances to fail. Following this, it completes a five-minute period of test at 60 cycles and sees another 36,000 opportunities for failure.

As was said, this stress is applied directly on the head section of the porcelain disc, which is the most vulnerable area, and which could not be given as localized a test after assembly. Furthermore, considerably more voltage before flashover can be imposed on a plain disc. When the metal cap is in place it bridges at least two inches of the head portion which is exposed at the time the plain disc is tested. Therefore, the inspection test is elevated several thousand volts above the maximum that could be obtained on an assembled unit.

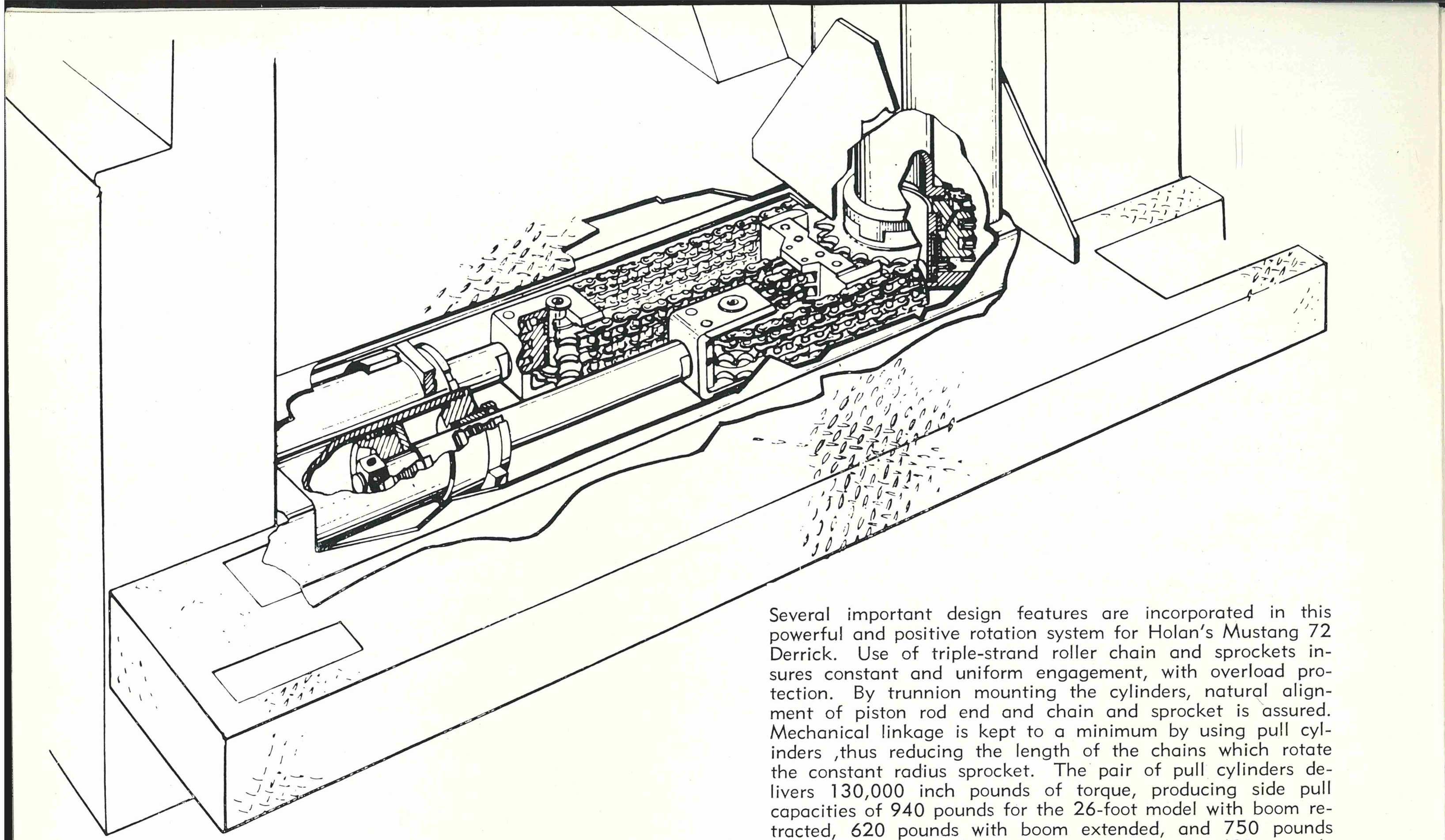
Visitors at the O-B plant generally ask two questions: "How many rejections do you get on this test?" and, "How do you know a unit on test has failed?"

Out of thousands of insulators a day, we may catch half a dozen defects. This, to the casual observer, might be considered a source of pride. Actually it is a source of real concern when you must be sure of discovering a single defective piece out of several thousand.

Answering the second question is easy. When a piece of porcelain punctures under test, it short-circuits the equipment. All flashing (and the almost deafening noise) stops. The entire output of the test transformer pours through a single path to ground, and there is no doubt where this is happening! The attendant shuts down the test, removes the damaged unit, disconnects the ground support, and restarts the machinery. This ground connection is replaced the next time the support passes the loading station and receives a new insulator.

. . . And if this doesn't seem enough electrical testing for a suspension insulator, each assembled unit gets another 15 seconds of flashover just before going into the shipping crate, to be sure it has sustained no handling damage.

How does this care pay off? Our records show an average of one electrical service failure in every 10-million manufactured units . . . a piece of performance that, to our knowledge, is unapproached in the industry. Some manufacturers have not made as many insulators in their entire history as we will make between two recorded cases of dielectric failure.



Several important design features are incorporated in this powerful and positive rotation system for Holan's Mustang 72 Derrick. Use of triple-strand roller chain and sprockets insures constant and uniform engagement, with overload protection. By trunnion mounting the cylinders, natural alignment of piston rod end and chain and sprocket is assured. Mechanical linkage is kept to a minimum by using pull cylinders ,thus reducing the length of the chains which rotate the constant radius sprocket. The pair of pull cylinders delivers 130,000 inch pounds of torque, producing side pull capacities of 940 pounds for the 26-foot model with boom retracted, 620 pounds with boom extended, and 750 pounds on the 32-foot model with boom retracted, 480 pounds with boom extended.

Holan's Mustang 72 derrick rotation system employs hydraulic pull cylinders, constant radius principle

Provides constant and uniform rotary positioning without adjustment

Since the swing from "A" frame to radial arm derrick design, countless engineering hours have been invested by manufacturers in the development of smooth, powerful, and fail-safe rotation systems.

One of the most revolutionary in concept and function is the system designed by Holan for the new Mustang 72 Derrick -- a 9,000-pound capacity derrick available in 26- and 32-foot sheave heights.

Twin, single-acting, hydraulic pull cylinders, connected by triple-strand roller chain to a constant radius sprocket, turn a vertically mounted torque tube which rotates the derrick 365 degrees. This unusual system of rotary positioning provides strong, constant, and uniform movement with up to 940 pounds of side load capacity.

The entire rotation "package" is housed within the horizontal portion of the base-frame assembly. lowering the derrick's center of gravity and shifting the major portion of derrick weight to the vehicle centerline -- a very important consideration for corner-mount units. Large, easily removed cover plates provide convenient access for inspection, lubrication, and service.

All components of the system are designed for trouble-free operation under the most severe loading conditions. Bronze bushings, work-hardened sprocket shafts, and a fatigue-resistant, pre-stressed roller chain assure smooth, positive rotation of the derrick superstructure.

Loads in excess of rated capacity actuate relief valves to prevent equipment damage. And, even though the relief valves are actuated by an overload condition, control over the load is maintained through Holan's unique hydraulic connections and valving.

The Mustang 72 may be mounted RHRC, CBOC, or CORA. Design and placement of the rotation package" permit use of full-line body configuration although the derrick is mounted in a bobtail position.

For more information about the Mustang 72 and its trouble-free, fail-safe rotation mechanism, write Holan Division, The Ohio Brass Company, 4100 West 150th Street, Cleveland, Ohio 44135.

Simplicity of Multirester base connection quickly adapts arrester to any grounding arrangement

THOREX®
MULTIRESTER

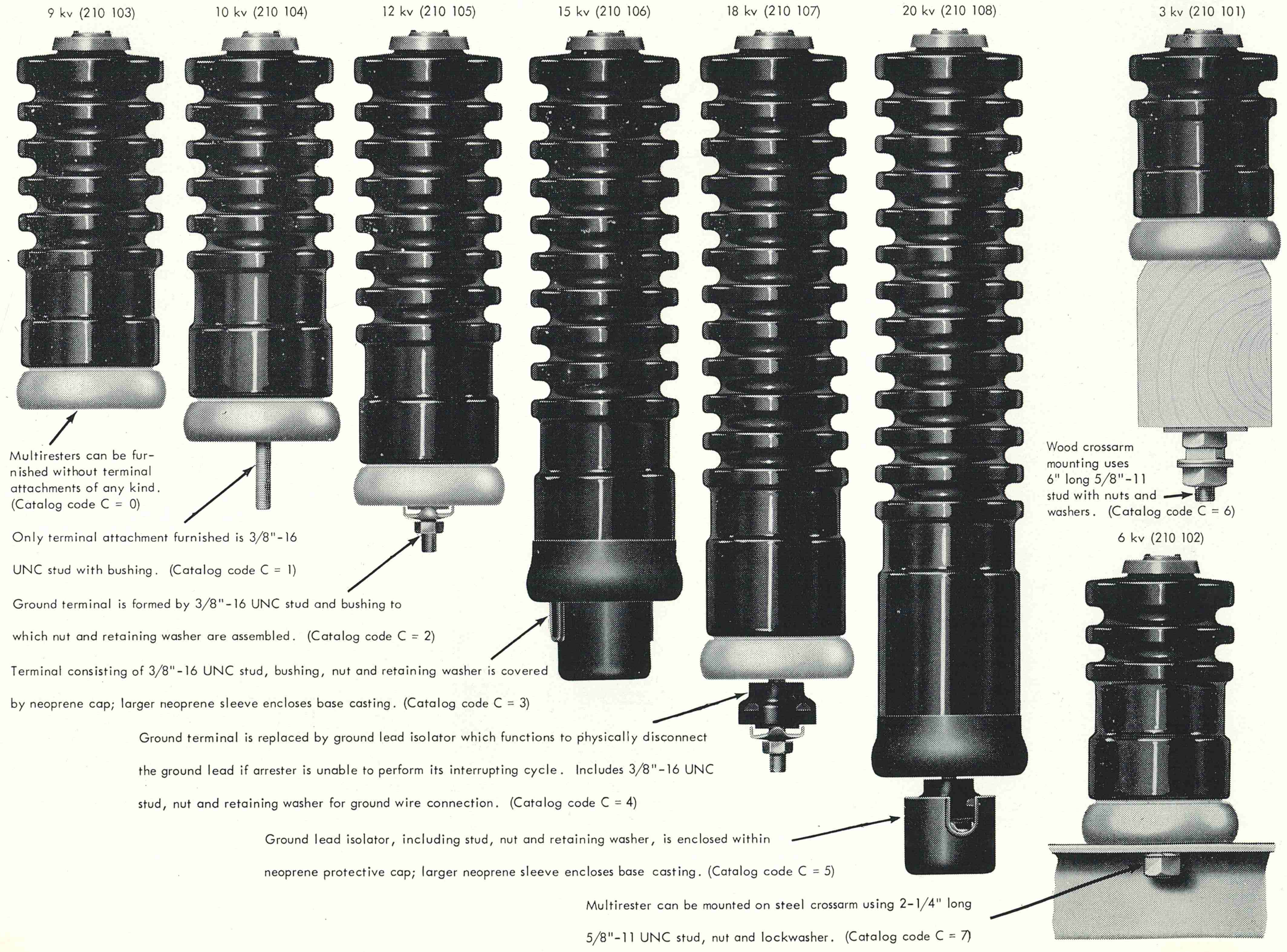
Reduce installed cost by ordering only parts actually needed

The sturdy, center-tapped malleable iron base which forms the bottom closure of all Multiresters permits many variations in ground lead connections. The greater adaptability of this base provides faster and easier application, and often eliminates the need for terminal accessories the total installed cost of distribution class arresters. Furthermore, most Multirester ground terminal parts are standard hardware items and additional savings may be realized by local purchase or by availability from warehouse stock.

Multirester's base casting is drilled and tapped ⅝-inch-11 to facilitate attachment of the ground lead terminal. Customary practice first inserts an inexpensive reducing bushing to permit use of the same ⅜-inch-16 terminal stud, nut, and retaining washer furnished for the line terminal. This reducing bushing is not required on arresters equipped with a ground lead isolator or on those intended for base mounting on crossarms.

Ground terminal parts are completely interchangeable among all ratings of Multiresters with the exception that direct base mounting on wood (C = 6) or metal (C = 7) crossarms is not recommended for the taller model Multiresters with ratings above 20 kv.

Catalog 43 explains the simple code system by which Multiresters can be ordered to include only those accessories needed to meet specific installation requirements. Ground lead terminal parts are the "C" portion of the 7 A B C suffix identification and the correct catalog number is quickly ascertained by substitution of the corresponding number designation of the accessory group selected.



Multiresters can be furnished without terminal attachments of any kind. (Catalog code C = 0)

Only terminal attachment furnished is 3/8"-16 UNC stud with bushing. (Catalog code C = 1)

Ground terminal is formed by 3/8"-16 UNC stud and bushing to which nut and retaining washer are assembled. (Catalog code C = 2)

Terminal consisting of 3/8"-16 UNC stud, bushing, nut and retaining washer is covered by neoprene cap; larger neoprene sleeve encloses base casting. (Catalog code C = 3)

Ground terminal is replaced by ground lead isolator which functions to physically disconnect the ground lead if arrester is unable to perform its interrupting cycle. Includes 3/8"-16 UNC stud, nut and retaining washer for ground wire connection. (Catalog code C = 4)

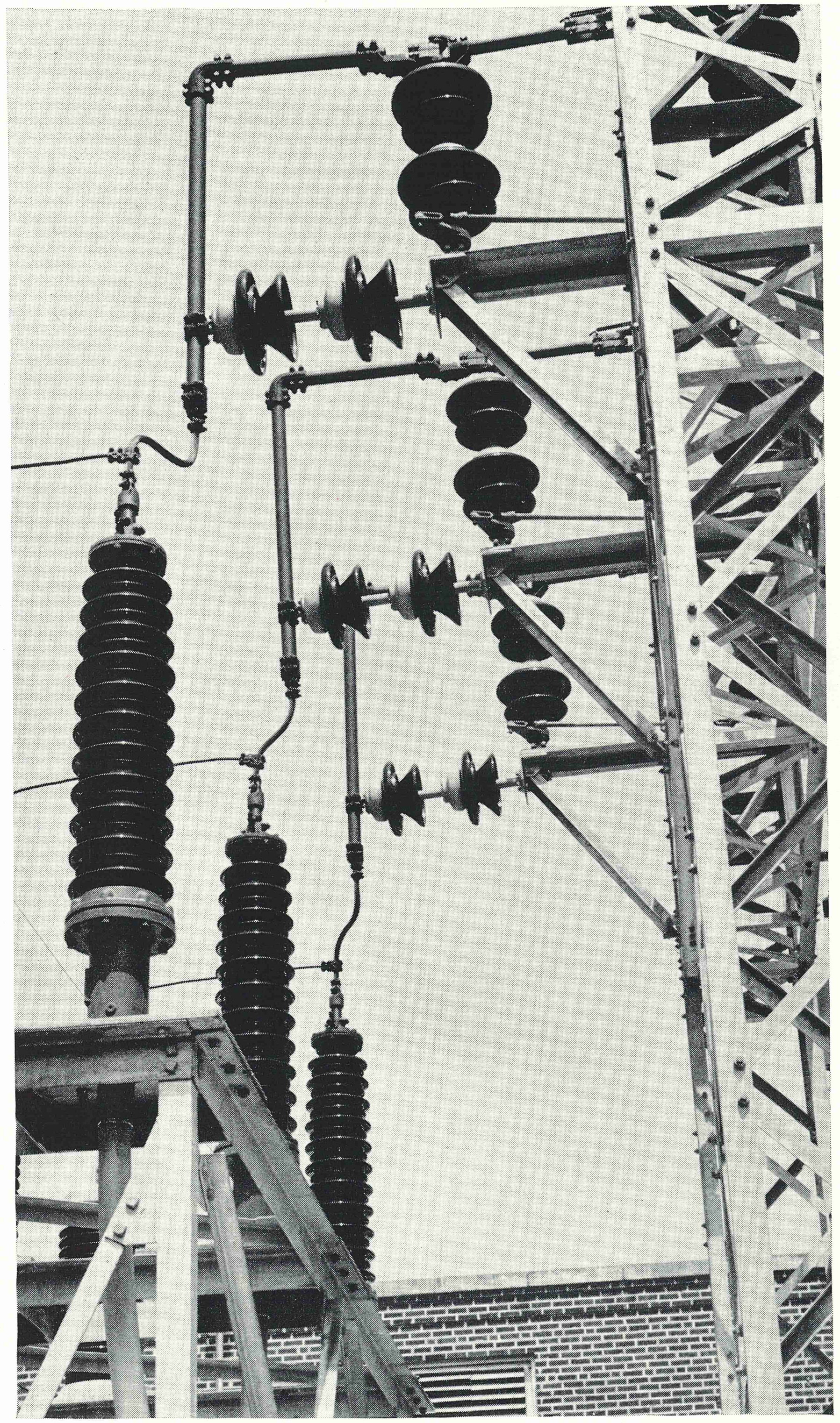
Ground lead isolator, including stud, nut and retaining washer, is enclosed within neoprene protective cap; larger neoprene sleeve encloses base casting. (Catalog code C = 5)

Wood crossarm mounting uses 6" long 5/8"-11 stud with nuts and washers. (Catalog code C = 6)

Multirester can be mounted on steel crossarm using 2-1/4" long 5/8"-11 UNC stud, nut and lockwasher. (Catalog code C = 7)

Only O-B's new capacitance graded potheads exert uniform control over voltage stresses of medium voltage underground terminations

Pre-assembled build-up roll combines capacitor and stress cone windings for faster, simpler pothead installations



Typical field installation of O-B's new 115-kv capacitance-graded potheads. Increased operating reliability confirms advantages in uniform voltage stress control in medium-range underground cable terminations.

Optimum grading structure for medium-voltage underground cable terminations has been incorporated into O-B's new capacitance-graded potheads for 69- through 161-kv transmission systems. Production models of the new potheads installed at several utility locations have already established service records which indicate that much higher levels of operating dependability can be assured than were possible with conventional potheads in this voltage range.

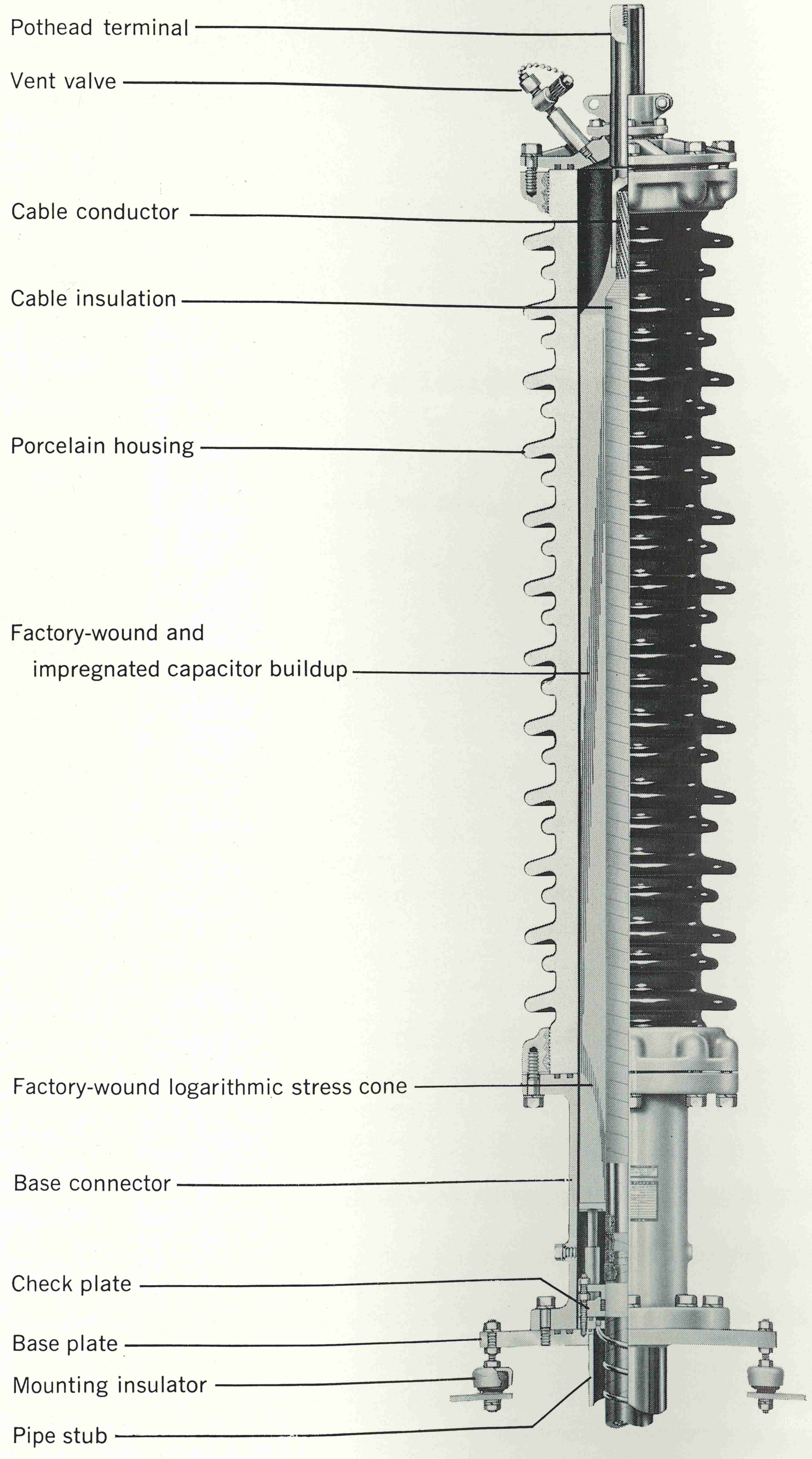
Superior performance is achieved through smooth, uniform control of the voltage gradient obtained by coordinating the unique advantages of the logarithmic stress cone with the inherent stability of the main capacitor buildup. Design principles are identical to those proved eminently successful in higher voltage applications of O-B capacitance-graded potheads.

Significant progress in simplifying pothead installations has been accomplished by integrating the multi-turn stress-cone assembly and the main capacitor grading structure into a single factory-wound and impregnated buildup roll, which can be field-tightened on the cable end in a matter of minutes. The substantial reduction in time of exposure of the cable end is particularly advantageous in combating contamination and physical damage. The pre-assembled buildup roll minimizes complex hand operations formerly required in finish wrapping and positioning of the internal components. Completion of the cable termination involves only a few simple connections, terminal adjustment, and final enclosure within the porcelain pothead housing.

O-B's new capacitance-graded potheads combine the most advanced techniques of sealing and gasketing developed during the Company's long and specialized experience in this field to produce a compact, durable assembly of exceptional strength and stability. Exposed metal parts are machined from nonmagnetic materials specifically chosen for their high corrosion-resistant qualities. One-piece exterior housings are of the finest grade O-B wetware porcelain.

Individual voltage ratings of the new potheads are 69, 115, 138, and 161 kv with BIL's of 350, 550, 650, and 750 kv respectively. Cable conductor sizes up to and including 3000 MCM can be accommodated. All ratings are available for use with pipe-type and oil-filled cables at all standard pressures.

Factory-assembled capacitor roll and stress cone simplifies installation of medium-voltage pothead, reduces exposure time of unprotected cable end.



OHIO BRASS MANAGEMENT REPORT

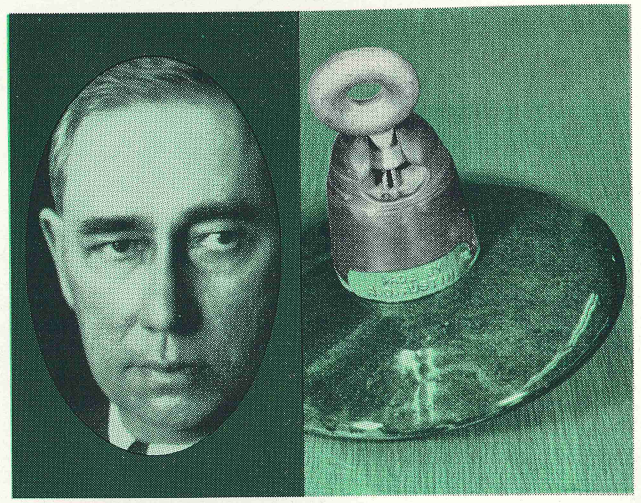
He came to buy but stayed to invent an insulator

BY ROGER A. BLACK
PRESIDENT, OHIO BRASS COMPANY

He came East from a California utility—a young engineer with a mission. He had been sent by his company to find a reliable source of high voltage insulators. The year: 1905. His name: A. (Arthur) O. Austin. It would make good sales ammunition to report that after exhaustive research he recommended Ohio Brass as the sole supplier. But we must stick to the facts. Besides, O-B was only part way into the insulator business at that time.

OUR YOUNG MAN FOUND that insulator manufacture was in the hands of pottery and dishware people. Understandably, they didn't know how to apply the principles of physics to combine two vastly different materials—metal and porcelain—into an insulator with the needed mechanical and electrical properties.

AUSTIN FIRST SET UP his own insulator factory but it burned before production started. He then came to Barberton, Ohio, as a consultant for the Akron High Potential Insulator Company — O-B's porcelain supplier and soon to be wholly owned by Ohio Brass.



HE PUT HIS IDEAS TO WORK. Rather than try to get strength by merely making suspension insulators bigger, he worked with thin sections. He did away with the serrated insulator head which allowed for only a straight mechanical attachment to the cap. He substituted the sanded surface to achieve positive gripping even when porcelain and metal expanded and contracted according to their vastly different temperature coefficients. He also developed the ball-and-socket joint to gain easy coupling of insulators and save space.

SATISFIED THAT he had an efficient suspension insulator design, "A. O." turned to high voltage research. You have probably seen pictures of the industry's first high voltage laboratory which he set up on his farm near the center of Barberton. Much of the technological background for modern EHV transmission evolved here as utilities brought their ideas for checking.

WE RECENTLY DISCOVERED the original cap-and-pin suspension insulator bearing the tag "Made by A. O. Austin." It evoked a flood of memories, including those you have just read, plus acknowledgement of the considerable debt our industry owes this man who died in 1964.

740-H

OHIO BRASS COMPANY • MANSFIELD, OHIO
Canadian Ohio Brass Co. Ltd. • Niagara Falls, Ontario

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Roger A. Black,
President of O-B,
looks at insulator
"Number One"
. . . See page three.